Multi-layer laminate for tubes and similar foil-type packaging, having an embedded barrier layer

Patent claims

1. Multi-layer laminate for tubes and similar foil-type packaging having an embedded barrier layer (30), a metal - especially aluminium - foil (60) and optionally an outer structure, especially an outer and/or sealing film (70),
characterised in that
the barrier layer (30) consists of one or more, especially mixtures, of the following materials:
   - polyamide (PA), especially aromatic and/or partly aromatic polyamide or mixtures thereof,
   - mixtures of polyamide (PA), especially aromatic and/or partly aromatic polyamide or mixtures thereof, with ethylene vinyl alcohol copolymer (EVOH) and/or polyacrylonitrile (PAN),
   - polyethylene terephthalate (PET),
   - polyacrylonitrile (PAN).

2. Laminate according to claim 1,
characterised in that
the barrier layer (30) is arranged on the inside of the packaging, between an inner sealing or contact layer (10) and the metal foil or layer (60), especially as part of an inner film (80).

3. Laminate according to one of claims 1 or 2,
characterised in that
there is provided, between the barrier layer (30) and the metal foil (60), a central sealing layer (40) and/or an especially extruded connecting layer (50).

4. Laminate according to one of the preceding claims,
characterised in that
an adhesion promoter (20) is provided between the barrier layer (30) and the layers surrounding the barrier layer (30), especially the inner sealing layer (10) and an outer layer.

5. Laminate according to one of the preceding claims,
characterised in that
the metal - especially aluminium - foil (60) is coated with a chromium-complex-comprising, especially lacquer-like, material.

6. Laminate according to one of the preceding claims,
characterised in that
the particular layers have thicknesses in accordance with the following table:

Layer	Layer thickness	Preferred layer thickness	Especially preferred layer thickness
Inner sealing or contact layer (10)	1 µm - 250 µm	3 µm - 150 µm	5 µm - 100 µm
Adhesion promoter (20)	1 µm - 140 µm	3 µm - 40 µm	5 µm - 25 µm
Barrier layer (30)	1 µm - 180 µm	2 µm - 80 µm	3 µm - 50 µm
Central sealing layer (40)	1 µm - 250 µm	3 µm - 150 µm	5 µm - 100 µm
Connecting layer (50)	1 µm - 180 µm	3 µm - 80 µm	5 µm - 50 µm
Metal foil (60)	1 µm - 150 µm	3 µm - 65 µm	5 µm - 40 µm
Outer structure (70)	1 µm - 300 µm	1 µm - 190 µm	1 µm - 110 µm

7. Laminate according to one of the preceding claims,
characterised in that
the particular layers comprise materials in accordance with the following table, in each case singly or in combination:

Layer	Material(s)
Inner sealing or contact layer (10)	Polyethylene (PE), polypropylene (PP), modified olefins, especially ionomers, ethylene acrylic acid (EAA), polyacrylonitrile (PAN), ethylene methacrylate (EMA), mixtures of afore-mentioned materials
Adhesion promoter (20)	Maleic anhydride (MA), modified olefins, especially ionomers, mixtures of afore-mentioned materials
Central sealing layer (40)	Polyethylene (PE), polypropylene (PP), modified olefins, especially ionomers, ethylene acrylic acid (EAA), polyacrylonitrile (PAN), ethylene methacrylate (EMA), mixtures of afore-mentioned materials
Connecting layer (50)	Ethylene acrylic acid (EAA), ethylene methacrylate (EMA), maleic anhydride (MA), modified olefins, especially ionomers, polyethylene (PE), mixtures of afore-mentioned materials
Outer structure (70)	Polyethylene (PE), polypropylene (PP), modified olefins, especially ionomers, ethylene acrylic acid (EAA), polyacrylonitrile (PAN), ethylene methacrylate (EMA), colorants, mixtures of afore-mentioned materials

8. Method of producing a multi-layer laminate for tubes and similar foil-type packaging having an embedded barrier layer (30), a metal - especially aluminium - foil (60) and optionally an outer structure (70), especially an outer and/or sealing film (70),
characterised in that
as the barrier layer (30) there is used
   - polyamide (PA), especially aromatic and/or partly aromatic polyamide or mixtures thereof,
   - mixtures of polyamide (PA), especially aromatic and/or partly aromatic polyamide or mixtures thereof, with ethylene vinyl alcohol copolymer (EVOH) and/or polyacrylonitrile (PAN),
   - polyethylene terephthalate (PET),
   - polyacrylonitrile (PAN).

9. Method according to claim 8,
characterised in that
an inner film (80) consisting of at least a sealing or contact layer (10, 40) and the barrier layer (30) and at least one adhesion promoter (20) arranged between the barrier layer (30) and the sealing or contact layer (10, 40) is co-extruded.

10. Method according to claim 8,
characterised in that
the barrier layer (30) is produced in the form of a film and applied to an inner sealing or contact layer (10) by means of extrusion lamination or adhesive lamination.

11. Method according to claim 8,
characterised in that
the inner sealing or contact layer (10), the barrier layer (30) and, optionally, a central sealing or contact layer (40) are applied directly onto the metal layer (60), where appropriate using an adhesion promoter (20), especially a primer, preferably a methacrylate.

12. Method according to one of claims 8 to 11,
characterised in that
the metal - especially aluminium - foil (60) is coated with a chromium-complex-comprising, especially lacquer-like, material.

13. Method according to one of claims 8 to 12,
characterised in that
the particular layers are produced having thicknesses in accordance with the following table:

Layer	Layer thickness	Preferred layer thickness	Especially preferred layer thickness
Inner sealing or contact layer (10)	1 µm - 250 µm	3 µm - 150 µm	5 µm - 100 µm
Adhesion promoter (20)	1 µm - 140 µm	3 µm - 40 µm	5 µm - 25 µm
Barrier layer (30)	1 µm - 180 µm	2 µm - 80 µm	3 µm - 50 µm
Central sealing layer (40)	1 µm - 250 µm	3 µm - 150 µm	5 µm - 100 µm
Connecting layer (50)	1 µm - 180 µm	3 µm - 80 µm	5 µm - 50 µm
Metal foil (60)	1 µm - 150 µm	3 µm - 65 µm	5 µm - 40 µm
Outer structure (70)	1 µm - 300 µm	0 µm - 190 µm	0 µm - 110 µm

14. Method according to one of claims 8 to 13,
characterised in that
the particular layers are produced with materials in accordance with the following table:

Layer	Material(s)
Inner sealing or contact layer (10)	Polyethylene (PE), polypropylene (PP), modified olefins, especially ionomers, ethylene acrylic acid (EAA), polyacrylonitrile (PAN), ethylene methacrylate (EMA), mixtures of afore-mentioned materials
Adhesion promoter (20)	Maleic anhydride (MA), modified olefins, especially ionomers, mixtures of afore-mentioned materials
Central sealing layer (40)	Polyethylene (PE), polypropylene (PP), modified olefins, especially ionomers, ethylene acrylic acid (EAA), polyacrylonitrile (PAN), ethylene methacrylate (EMA), mixtures of afore-mentioned materials
Connecting layer (50)	Ethylene acrylic acid (EAA), ethylene methacrylate (EMA), maleic anhydride (MA), modified olefins, especially ionomers, polyethylene (PE), mixtures of afore-mentioned materials
Outer structure (70)	Polyethylene (PE), polypropylene (PP), modified olefins, especially ionomers, ethylene acrylic acid (EAA), polyacrylonitrile (PAN), ethylene methacrylate (EMA), colorants, mixtures of afore-mentioned materials